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ABSTRACT

A study examined and tested the knowledge sources individuals tap in the planning process and the process of plan modification. It is expected that contrary to plan-based theories, individuals will fail to remediate flaws in their plans if given the chance to develop a plan to pursue the same goal. It is also expected that differences exist between individuals' planned and actual performances as measured by the knowledge sources used in the respective planning procedures. Finally, it is expected that providing participants with arguments for a persuasion goal will validate the assumption that role model knowledge is a primary source of knowledge in planning to reach persuasive goals. Subjects, 15 communication students at a midwestern university took part in 2 sessions spaced 2 weeks apart from each other. At the first session they were asked to participate in two scenarios. In the first, they were to ingratiate themselves with a new roommate. In the second, they were to persuade another person to accept their view as to whether or not alcohol should be allowed in the dormitories. At the second session, they were given the same two problems and asked to talk through them aloud into a tape recorder. As expected, the results showed no consistent relationship between success and failure of a plan and plan modification. Findings raise questions about the adequacy of humans as planners and basic assumptions of the plan modification model. (Contains 5 tables of data and 15 references.) (TB)

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Sources of Knowledge and Plan Modification:

Testing Aspects of Cognitive Planning Theory

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SOURCES OF KNOWLEDGE AND PLAN MODIFICATION

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Sources of Knowledge and Plan Modification:

Testing Aspects of Cognitive Planning Theory

ABSTRACT

The present study examines and tests certain aspects of cognitive planning theory as proposed by Berger. Participants took part in two experiments designed to measure knowledge sources individuals tap in the planning process and the process of plan modification. Results showed no consistent relationship between success and failure of a plan and plan modification, as expected. Knowledge source analysis partially confirmed and partially contradicted previous findings. The findings raise questions about the adequacy of humans as planners and basic assumptions of the plan modification model.

Introduction

Cognitive planning theory focuses on the role cognitive structures such as plans and scripts play in driving human action. The present study examines and tests certain aspects of cognitive planning theory as proposed by Berger (1988; Berger & diBattista, 1992; Berger & Jordan, 1992). Specifically, it investigates the knowledge sources individuals tap in the planning process and the process of plan modification. It is expected that contrary to plan-based theories, individuals will fail to remediate flaws in their plans if given the chance to develop a plan to pursue the same goal. It is also expected that differences exist between individuals' planned and actual performances as measured by the knowledge sources used in the respective planning procedures. Finally, it is expected that providing participants with arguments for a persuasion goal will validate the assumption that role model knowledge is a primary source of knowledge in planning to reach persuasive goals.

The role cognition plays in driving human action is a vital area of research in communication (Berger, 1988; Berger & diBattista, 1992; Berger & Jordan, 1992; Cody & McLaughlin, 1990; Dillard, 1990; Greene, 1990), artificial intelligence (Carberry, 1990; Hammond, 1989; Schank, 1982; Schank, 1989) and psychology (Friedman, Scholnick & Cocking, 1987). Researchers call for further development of theory and more experimentation (Berger, 1988; Berger & diBattista, 1992; Berger & Jordan, 1992; Dillard, 1990; Friedman, Scholnick & Cocking, 1987; Greene, 1990; Wilson, 1990). Several reasons for further study of this area exist.

The number of studies examining cognitive structures and action have increased in recent years as researchers across disciplines have shifted from a theory of human nature that views humans as guided exclusively by environmental rewards to a theory of humans as purposeful, planning social actors (Greene, 1990). Thus, theories of planning seek to provide insight into one of the fundamental questions of research involving humans — how do humans reason and plan action (Schank, 1982). Tactical communication research in the last several years has focused on the topic of cognition and message production (Cody & McLaughlin, 1990). The goal-planning-

action (GPA) sequence can be used to generate possible explanations of human behavior (Dillard, 1990). The basic assumption guiding this investigation is that current cognitive planning theories overemphasize the goal-planning-action sequence. Research shows that current theories proposing human action primarily guided by planning as only partially adequate. However, a cognitive planning theory must integrate environmental and physiological stimuli and rewards into a cognitive-planning framework.

Although several researchers have investigated cognition and action production in the field of tactical communication (Cody & McLaughlin, 1990), Berger appears to propose the most developed theory linking cognitive structures to action within a case-based planning framework. According to Berger, cognitive planning theory addresses an area neglected in interpersonal communication research because existing research addresses the link between cognition and understanding only. In the process of understanding, social actors observe other actors' behavior and infer their goals and plans from their observed behavior. In contrast, Berger's cognitive planning theory looks at how actors generate goals and plans and then produce action by implementing these plans. The essence of the theory is that planning is critical to human action. The link between cognition and action needs to be studied separately from the link between cognition and understanding because of the potentially drastic differences between action and understanding (Berger, 1988).

The importance of a planning perspective to tactical communication is underscored by Waldron's (1990) study, which found that 44% of more than 2,000 subjects recalled having goal- and plan-directed thoughts during interactions. Current communication theory focuses on the role cognitive structures such as records, message design features and plans play in goal-directed action production (Berger & diBattista, 1992). Further work on knowledge structures and the processes of plan access and plan modification is needed, according to Berger & diBattista (1992). The present investigation focuses on these aspects.

Hammond (1989) and Schank (1982, 1989) strongly argue for a case-based approach to planning over previously generated rule-based approaches. Schank (1989) considers case-based reasoning "the essence of how human reasoning works" (p. xiii). According to case-based planning theories, individuals store failures as well as successes and are thus able to anticipate and avoid future plan failures (Hammond, 1989). Rather than recovering from errors and then forgetting the results of the recovery, planners learn from their errors (Hammond, 1989). According to Hammond (1989), planning failures are followed by repair of both the faulty plan and the faulty knowledge base that led to incorrect plan construction. As Berger (1988) reviews, one might expect planners to evaluate past experiences to determine what causes of action worked well and which did not, so that present plans could be improved. Since all planning tasks make use of past information, Hammond (1989) argues, the best approach to planning is to find and modify past plans rather than rebuild one from a set of rules each time.

These theoretical assumptions about plan modification are contradicted by the findings of Berger and Jordan (1992). They found that participants virtually never provided spontaneous evaluations of the efficacy of their prior experiences, and most appeared to simply retrieve the experience and use it uncritically to formulate their plan. Planners rarely indicate flaws in their previous courses of action to reach the same goal and their attempts to remediate these flaws in current plans. Berger and Jordan (1992) suggest that individuals may suffer from a success bias when planning or that individuals may not have been able to generate alternatives to their previous experiences. Still, they conclude that individuals appear considerably less critical of their previous experience than might be expected. More work needs to be done to assess the adequacy of people as planners (Berger & Jordan, 1992).

The importance of studying if and how individuals critically evaluate prior experiences stems from the fact that plan modification is a central assumption of case-based planning theories. Plan modification is an essential element of the process of achieving goals. According to Hammond (1989) and Schank (1982), plans are indexed in a dynamic memory by

goals, successes and failures, which may prevent individuals from repeating mistakes. Since the issue of plan modification seems to be of critical importance to evaluating the entire planning process, it seems important to design experiments that will attempt to empirically measure this process. More experimentation in this area will also allow for a closer examination of the interpersonal and psychological consequences of goal failure and success, an area of further research called for by Cody and McLaughlin (1990). To test the theoretical assumptions of case-based planning in regard to plan modification, the present study gave individuals the opportunity to evaluate their performance and reflect on planning modifications for future performances. Although case-based planning theories seem intuitively convincing because of their implications for cognition and communication efficiency, it seems likely that individuals will fail to remediate flaws in their plans if given the chance to develop a plan to pursue the same goal.

The foregoing discussion suggests the following research question:

RQ1: Do individuals adjust plans to better reach the same goal for a second interaction based on previous success or failure of the planning process?

The knowledge sources individuals tap during the planning process also need to be investigated further to test theoretical assumptions of case-based planning laid out by Berger (1988; Berger & diBattista, 1992; Berger & Jordan, 1992; Hammond (1989) and Schank (1982). Greene (1990) argues that to explain strategic message production, a model of the representation, selection and utilization of the procedural information is needed. In 1982, Schank revised earlier theories involving knowledge structures and suggested scripts as dynamic memory structures that are built up over time by repeated encounters. These scripts are embedded in a dynamic memory as generalizations of particular scenes.

Recent theory stresses the influence of specific episodes stored in memory, which led Berger and Jordan to determine the extent to which particularistic vs. generalistic experience is used as a basis for devising plans (Berger & Jordan, 1992). Subjects were instructed in the think-aloud

procedure and indicated their thoughts in trying to solve four problems. Results indicated significant variations in use of planning sources among the four goals, based, in part, on the degree of goal familiarity. Berger and Jordan (1992) concluded that planning is at least in part based on similar episodes retrieved from memory. They found support for their hypothesis that as familiarity with goals decreases, planners will rely more on person or role knowledge than event knowledge in formulating their plans. Berger and Jordan (1992) express that a potential challenge to their interpretations might arise from the possibility that the participants in the study do not actually engage in planning but merely fill in details of the general scenario they were presented in the problem statements.

Not much research has addressed the origins of plans (Berger & Jordan, 1992). Individuals are presumed to bring knowledge to the planning process and to the interaction, which allows them to comprehend the interaction. Berger and Jordan (1992) investigated sources of knowledge used in plans by ordering knowledge into the following categories: specific episodes, hypothetical episodes, ensembles of episodes, role models, instruction, and previous plans. Ensembles are collections of similar episodes, representing a generalization based on repeated experiences. Hypothetical episodes consist of singular, imagined interactions. In their results, Berger and Jordan found differences between the sources of knowledge used and the goal pursued. They also were led to reject their hypothesis suggesting that individuals use more generalistic knowledge when it is available. In light of their findings, the present investigation will generate a comparable set of data as a replication of the work of Berger and Jordan.

In particular, the present investigation was designed to compare the knowledge sources used in planning to knowledge sources used in actual performance. Comparing knowledge sources may help shed light on the critical question whether, or to what extent, planning matches actual performance. In his 1988 experiment, Berger reported examining the social goal of asking another person for a date through a questionnaire to which the participants responded while revealing their planning processes through think-aloud procedures. In order to test whether

there is any relationship between the verbally reported planning sequences and actual performance, a pilot study was conducted, in which participants were instructed to engage in the date-request action with a confederate. The interactions were videotaped. However, because of the coding difficulties involved, the study did not compare the structure of plans as articulated in the protocols with the structure of actions shown in the interactions. Berger (1988) concluded that techniques must be developed to assess the extent to which plans are realized in social actions.

Findings of a 1983 study by Berger and Kellermann suggest that persons may be partially unaware of how they achieve their conversational goals, even when they are aware of those goals, and that they may not have very well-articulated conversational goals during ordinary conversational conditions. As Berger and Kellermann (1983),state, this raises questions about the validity of self-report data about interactions.

This study allowed for the comparison of knowledge sources by asking participants who had engaged in a goal-directed social interaction to describe their planning process and goal achievement. The assumption was, based on the findings of Berger and Kellermann (1983) that there would be a difference between individuals' actual behavior and their self-reported planning process. This assumption is based on the fact that some have questioned the accuracy of self-report data to reflect the planning procedure as well as Berger's own (1988) question whether individuals are able to distinguish between possible and probably worlds in their planning.

This leads to the second research question:

RQ2: Which sources of knowledge do persons use in planned interactions vs. actual performances?

One contradictory finding of the Berger and Jordan (1992) study consisted of the high frequency of role model knowledge as a knowledge source in efforts to reach the persuasion goal, which was found to be the most familiar goal. The finding appears contradictory to the same

study's finding that participants frequently used role model knowledge to reach the millionaire goal, which was judged to be the least familiar goal. Berger and Jordan suggested that the lack of familiarity with this goal led to the use of role model knowledge. As participants lacked event knowledge of how to reach the unfamiliar millionaire goal, they relied on role model knowledge. This explanation seems to be contradicted by the finding that the participants also most frequently relied on role model knowledge to reach the persuasion goal.

Berger and Jordan (1992) addressed this discrepancy with the explanation that this result did not indicate lack of knowledge about how to persuade but lack of knowledge of particular arguments, and that the goal of persuading someone was familiar but what particular arguments one might use unfamiliar. This experiment will test the explanation given by Berger and Jordan (1992) for the predominant use of role knowledge in planning for a persuasion goal by furnishing participants with knowledge of particular arguments prior to their participation in the planning procedure. Exploration of this assumption is important because Berger and Jordan (1992) conclude that their findings suggest the primary importance of role model knowledge in formulating persuasion plans.

The preceding discussion leads to the third research question:

RQ3: Is the use of the role model knowledge source in planning processes designed to solve a persuasion problem attributable to the lack of arguments rather than the lack of knowledge of how to persuade?

The purpose of the present investigation is to test theoretical assumptions of plan modification, to generate further data and to replicate findings. This will be accomplished by using experimental designs similar to Berger and diBattista (1992) and Berger and Jordan (1992).

Method

Participants

Fifteen communication students (nine female, six male) at a Midwestern university participated in this study for extra credit. All students took part in two sessions; the second session took place two weeks after the first one.

Procedures

Experiment 1: Participants reported individually to the communication lab and were asked to take part in two short (5 min.) role plays, in which they attempted to achieve two specific goals. They were given cards specifying the two scenarios, which are identical to the scenarios used by Berger and Jordan (1992), so that the results of this study could be compared. A confederate, who was instructed to act normally, was the participants' partner in the interactions, which were videotaped and audiotaped.

The two scenarios were:

(1) *Roommate Ingratiation Goal.* You are about to meet your new roommate at the beginning of the year. You are interested in getting this person to like you. How would you go about getting your new roommate to like you?

(2) *Persuasion Goal.* You are interested in persuading another person to accept your personal opinion about whether alcohol consumption in dormitories at your university should or should not be banned. How would you go about getting the person to agree with your opinion on this issue?

Half of the participants received cards which listed the roommate goal first; the others received a card that listed the persuasion goal first. In a modification to the design by Berger and Jordan (1992), participants were furnished with a list of arguments (both pro and contra) for the persuasion goal (see Table 1).

Insert Table 1 about here

After the role playing, participants filled out a questionnaire with several open-ended items, in which the participants were asked to rate achievement of their interactional goal a success or failure, how they thought they achieved the goal, and if not, how they could improve their behavior. Participants were then thanked.

Experiment 2: Two weeks later, the participants reported individually to the lab. Participants were seated across from the experimenter with a tape recorder in full view. The experimenter read a set of instructions for the think-aloud procedure with retrospective reports taken from Ericsson and Simon (1993). These instructions ask persons to indicate continuously to the experimenter the thoughts they are having while trying to solve various problems. The experimenter encourages the participant to continue talking at all times from the time the participant first sees the problem until a solution to the problem is given. In a follow-up question, participants are asked to indicate everything they can remember about their thinking while they solved the problem.

As Ericsson and Simon (1993) summarize, concurrent and retrospective reports are now commonly accepted sources of data on cognitive processes in humans. An obvious problem involving subjects' verbal descriptions of their own cognitive processes is that the information subjects retrieve during their actual performance may differ from the information they retrieve during the report. However, the use of concurrent verbal reports, as used in this design, is intended to minimize temporal differences so that processing and verbal reports coincide in time (Ericsson & Simon, 1993).

Each participant was given a practice problem to familiarize herself or himself with the think-aloud procedure, after which the tape recorder was turned on. Participants were then presented with two different scenarios and asked to think aloud as they planned to accomplish the goals specified in the scenario. The two scenarios were identical to the ones used in Experiment 1.

In a modification to the design by Berger and Jordan (1992), participants were furnished with a list of arguments (both pro and contra) for the persuasion goal. Half of the participants received cards which listed the roommate goal first; the others received a card that listed the persuasion goal first. After completing the task, the students were thanked.

Protocol Analyses

The audiotapes and videotapes of the role plays and the audiotaped participants responses were transcribed. To address Research Question 1 (*Do individuals adjust plans to better reach the same goal for a second interaction based on previous success or failure of the planning process*), the transcripts of Experiments 1 and 2 were coded. First, an analysis of all transcripts yielded a list of potential information or action units, which were collapsed into 24 conceptual action units (CAUs) for the roommate goal and into 18 CAUs for the persuasion goal. Using the transcripts, one coder identified the occurrence of CAUs within each subject's response for both goals in each experiment. Multiple instances of a CAU within a response to a given goal were counted only once. Results of the questionnaire the participants filled out after Experiment 1 were tabulated. An individual tabulation of results for each subject was necessary to be able to compare that subject's response in Experiment 1 with that subject's response in Experiment 2.

Since subjects indicated their perception of whether they succeeded or failed to reach their goals in Experiment 1, it was hypothesized that the detailed match of individual performances would be able to indicate whether individuals who fail to reach their goal and state that they intent to modify their plans actually do so in the next interaction. It was expected that the plan modifications predicted by individuals in the questionnaire following their attempt to reach a specific goal would not be incorporated into their next attempt to reach the same goal. Significant differences in the CAUs used in Experiment 1, the CAUs used in Experiment 2 would indicate actual plan modifications, and significant differences between the

CAUs predicted in the questionnaire and the CAUs used in Experiment 2 would be able to indicate successful plan modification based on previous failure.

To address Research Questions 2 and 3 (*Which sources of knowledge do persons use in planned interactions vs. actual performances?* and *Is the use of role model knowledge in the persuasion problem attributable to a lack of argu*ments?), the transcripts of Experiment 2, where participants thought aloud about reaching the roommate and persuasion goals, were coded. Using the transcripts, one coder identified 11 planning sources for the roommate goal and 12 planning sources for the persuasion goal, six of which were taken from Berger and Jordan (1992). As in Berger and Jordan (1992), an additional pass was made through the protocols to identify responses indicating that the participants did not know how to devise a plan to reach the goal and responses demonstrating a lack of desire to reach the goal. Multiple references to the same planning source within a response to a given goal were counted only once. The coder did not infer what sources might be used to generate a specific plan; only explicit references were counted. Table 2 contains definitions and examples of the 10 planning sources.

Insert Table 2 about here

These research questions were designed to expand and validate the findings of Berger and Jordan (1992). Comparing sources of knowledge for plans as evidenced in the think-aloud procedure and the actual performance would shed light on the significance of sources of knowledge in planning. Research Question 3 was designed to provide empirical evidence for Berger and Jordan's (1992) explanation of discrepancies in their results. If person and role knowledge is not the primary source of knowledge used by participants to reach the persuasion goal in this experiment, this would indicate that Berger and Jordan's (1992) explanation is accurate, since subjects are provided with a list of arguments in this design.

Data Processing

An independent coder and the researcher coded one-third of the subjects' responses for all categories achieving 84% agreement. Differences in coding were resolved through discussion.

Results

Research Question 1 was designed to investigate whether individuals adjust plans to better reach the same goal for a second interaction based on previous success or failure of the planning process. This experiment found strong differences in success and failure rating and predicted plan modification between the roommate and persuasion scenarios. For the roommate goal, 86.6% of the participants rated their initial interaction (Experiment 1) a success, and 13.4 % said they failed. Mean success rating on a scale of 1 (not at all successful) to 7 (very successful) was 5.4 (pretty successful). In contrast, the majority of participants (53.4%) said they failed in achieving their interactional goal in the persuasion scenario, and only 46.6% said they succeeded. Mean success rating was 4.4 (unsure).

For the roommate scenario, all (100%) of those who said they failed in Experiment 1 said they would change their plan in another interaction. These participants actually changed their plan as evidenced in Experiment 2. However, these instances of plan modifications cannot be considered representative due to the low number of failure ratings obtained. For the persuasion scenario, only 50% of those who said they failed in Experiment 1 said they would change their plan if given another opportunity. Of those, again only 50% actually changed their plan in Experiment 2. Participants who said they failed were not the only ones indicating future plan modification. Overall, 53.3% of all participants said they would adjust their plans for the roommate goal, and 73.3% for the persuasion goal.

Of those who said they succeeded in the roommate goal in Experiment 1, 46.15% said they would adjust their plan and 53.85% said they would not. Of those who said they succeeded in the persuasion goal in Experiment 1, 71.42% said they would change their plan and 28.58% said they would not. For the roommate goal, 87.5% of those who said they succeeded and would change their plans actually changed their plans in Experiment 2. All of those who indicated success and said they would not change their plans did, however, change their plans in Experiment 2. For the persuasion goal, 60% of those who said they succeeded and would change their plan actually changed their plan in Experiment 2. Fifty percent of those who said they succeeded and would not change their plans changed their plans in Experiment 2 (see Table 3).

Insert Table 3 about here

Analysis of plan modification was based on comparison of CAUs used in Experiment 1 and Experiment 2. For the roommate goal, the most frequently used CAUs in Experiment 1 were *Self Disclosure* (occurred in 93.3% of participants), *Asking about Hometown* (86.6%) and *Asking about Interests* (80%). In Experiment 2, participants said they planned to use *Asking about Interests* (73.3%), *Seeking Similarities* (60%) and *Introduction*, (46.6%) (see Table 4). For the persuasion goal, the most frequently used CAUs in Experiment 1 were *Irrelevance Argument* (60%), *Safety Argument* (53.3%) and *Expertise*, (46.4%). In Experiment 2, participants most frequently said they planned to use *Negative Examples, Assessing Reaction* (40% each) and *Safety Argument* (33.3%) (see Table 4).

Insert Table 4 about here

Research Question 2 was designed to determine which sources of knowledge persons use in planned interactions vs. actual performances. However, participants did not provide sufficient

information on the questionnaire to allow the desired analysis of knowledge sources. Instead, only knowledge sources from Experiment 2 could be analyzed and categorized. The most frequent knowledge source for the roommate scenario was *Specific Episodes*, followed by *Previous Plan* and *Hypothetical Episodes* (see Table 5). *Specific Episodes* were mentioned by 46.6% of the participants, *Previous Plan* by 40% and *Hypothetical Episodes* by 26.6%.

Insert Table 5 about here

For the persuasion goal, the most frequent knowledge sources were *Role Model* knowledge (53.3% of participants mentioned it), followed by *Previous Plan* and *Hypothetical Episodes* (26.6% each) (see Table 5). Four participants also noted a *Lack of Same Episode* to draw from in their planning activity.

Research Question 3 examined whether the use of role model knowledge in planning processes designed to solve a persuasion problem is attributable to a lack of arguments rather than a lack of knowledge of how to persuade. Role model knowledge was the most frequently mentioned knowledge source for the persuasion scenario in Experiment 2 (mentioned by 53.3% of participants). Participants had been furnished with a list of arguments (see Table 1).

Discussion

This investigation examined and tested certain aspects of cognitive planning theory as proposed by Berger (1988; Berger & diBattista, 1992; Berger & Jordan, 1992). Results of the present study showed no consistent relationship between success and failure of a plan and plan modification, as expected. The findings raise questions about the adequacy of humans as planners and basic assumptions of the plan modification model.

Research Question 1 examined whether individuals adjust plans to better reach the same goal for a second interaction based on previous success or failure of the planning process. The

results lend support to the hypothesis that individuals will fail to remediate flaws in their plans if given the chance to develop a plan to pursue the same goal. Although the assumption was tested on two scenarios, the high success rate for the roommate goal (86.6%) did not allow for an analysis of the plan modification of the participants who said they had failed. An important finding of the study was that only half the participants who said they had failed to reach the persuasion goal said they would adjust their plan, and only half of those actually adjusted their plans. Another important finding is that it appears that failure or success of plan as judged by the planner is not the crucial factor in determining whether a plan should be modified. Rather, it seems, the more fact of trying out a plan may prompt modification. This finding conflicts with the idea that plans are indexed in a dynamic memory by goals, successes and failures, which may prevent individuals from repeating mistakes (Hammond, 1989; Schank, 1982). These findings thus support Berger's observation (Berger & Jordan, 1992) about apparent inadequacies of humans as planners. Berger and Jordan (1992) found that planners rarely indicate flaws in their previous courses of action and attempts to remediate these flaws in current plans. They suggested planners may suffer from a success bias. The current study provides partial support for this notion in the high success rate for the roommate goal. However, this assumption is also contradicted by the present study in that 53.3% of all participants modified their plans for the roommate scenario and 73.3% of all participants for the persuasion scenario.

The most striking finding of this study in regard to Research Question 1 is that planners appear unable to actually perform as they predict. They modify plans when they predict they will not modify them, and they fail to modify them when they predict they will modify them. Clearly, more research needs to address the adequacy of humans as planners. The present study suggests two explanations for these findings. It is possible that humans may be inadequate planners, who are only partially aware of their cognitive planning processes and not able to retrieve and modify plans based on failure or success. It is also possible that humans have these

planning capacities but are not able to adequately judge success or failure of a plan due to the success bias.

Research Question 2 was designed to examine which sources of knowledge persons use in planned interactions vs. actual performances but results only allowed analysis of use of knowledge sources in Experiment 2 (planned interaction). Still, the findings are important in light of previous research. In 1992, Berger and Jordan concluded that planning is at least in part based on similar episodes retrieved from memory. They found support for their hypothesis that as familiarity with goals decreases, planners will rely more on person or role knowledge than event knowledge in formulating their plans. The findings of the present study contradict some of Berger and Jordan's (1992) findings. For the roommate goal, *Specific Episodes*, then *Previous Plan* and then *Hypothetical Episodes* were the most frequently used knowledge sources. Berger and Jordan (1992) also found *Specific Episodes* as the most frequent knowledge source for this goal, but they also found hypotheticals rarely retrieved and previous plans as the least frequent knowledge source. The present findings thus validate their emphasis on specific episodes, but more research needs to take place to determine the status of the use of hypotheticals and previous plans as knowledge sources. This study's findings indicate planners may rely more on abstract, generalized sources of knowledge than thought.

For the persuasion goal, *Role Model*, then *Previous Plan* and *Hypothetical Episodes* were the most frequently used knowledge sources. This supports Berger and Jordan's (1992) findings of role model knowledge as the most frequent source, but as with the roommate scenario, the high frequency of previous plan and hypothetical episodes contradicts Berger and Jordan's findings that hypotheticals are rarely retrieved and previous plans are the least frequent knowledge source and lends support to the hypothesis that planners use more abstract and generalized sources of knowledge. This would actually support the initial hypothesis of Berger and Jordan's (1992), which stated that planners use more generalistic knowledge when it is available, and which was rejected in their study.

One contradictory finding of the Berger and Jordan (1992) study consisted of the high frequency of role model knowledge as a knowledge source in efforts to reach the persuasion goal. Research Question 3 was designed to test Berger and Jordan's (1992) assumption that the high frequency of role model knowledge is attributable to a lack of arguments rather than a lack of knowledge of how to persuade. In the present study, participants were furnished with a list of arguments for the persuasion goal. Although they had access to these arguments, participants still relied most frequently on role model knowledge. This suggests that Berger and Jordan's explanation is inadequate and that the high frequency of use of role model knowledge is not attributable to a lack of arguments. This finding then challenges the relationship between goal familiarity and role model knowledge suggested by Berger and Jordan (1992). If the relationship between goal familiarity and role model knowledge use proposed by Berger and Jordan (1992) exists, then either planners are less familiar with the persuasion goal than they think they are or planners are familiar with the persuasion goal and there is no relationship between goal familiarity and role model knowledge use.

Limitations and Future Research

The present study did not allow to investigate the relationship between planned and actual performance as envisioned in the design because of the insufficient questionnaire responses. A follow-up study should be designed to further investigate this subject. The questionnaire needs to be redesigned or replaced with an exit interview. The fact that subjects frequently mentioned they lacked a same episode to draw from could be interpreted as lack of awareness of cognitive processes or that participants do not recognize Experiment 1 as a real occurrence of that episode. If the latter is true and plans used in experimental situations are not referenced and indexed in planners' memories as actual episodes, the entire experimentation for cognitive planning theories would need to be reconsidered.

Although the present study was not designed to examine gender, it became apparent that

gender differences may exist. It appeared to both the confederate and the experimenter that female participants would first inquire about the confederate's point of view and then initiate a persuasive conversation, while male participants would immediately begin to persuade the confederate. It also appeared that the gender of the confederate may have influenced participants' performance in the roommate scenario, since at least one male participant expressed surprise that he should engage in a roommate conversation with a female confederate. A follow-up study should contain a research question related to gender and take into account the effect of the confederate's gender on the interaction.

he present study examines and tests certain aspects of cognitive planning theory as proposed by Berger (1988; Berger & diBattista, 1992; Berger & Jordan, 1992). Specifically, it investigates the knowledge sources individuals tap in the planning process and the process of plan modification. It is expected that contrary to plan-based theories, individuals will fail to remediate flaws in their plans if given the chance to develop a plan to pursue the same goal. It is also expected that differences exist between individuals' planned and actual performances as measured by the knowledge sources used in the respective planning procedures. Finally, it is expected that providing participants with arguments for a persuasion goal will validate the assumption that role model knowledge is a primary source of knowledge in planning to reach persuasive goals.

This study examined specific aspects of cognitive planning theory. The results may warrant further examination and perhaps reevaluation of the knowledge sources individuals tap in the planning process and the process of plan modification. Differences documented between individuals' planned and actual performances and individuals' apparent inability to accurately predict or assess their verbal behavior raise questions about fundamental assumptions of cognitive planning theories. It is hoped that this study not only adds to the knowledge base in this area but also helps determine what questions need to be asked in further investigations.

Table 1

List of Arguments for Persuasion Scenario:

Alcohol Consumption Should Be Banned:	Alcohol Consumption Should Be Permitted:
• alcohol conducive to violence and date rape	• alcohol in moderation helps people be less inhibited
• alcohol is a drug; other drugs are banned	• alcohol is legal
• dormitories should be "safe" living spaces	• alcohol is part of regular adult and social life
• alcohol can be addictive	• allowing alcohol consumption on campus prevents drinking and driving
• alcohol can induce accidents	• college students will drink alcohol anyway
• alcohol may cause incidents for which the university may be liable	• peers may watch out for each other's consumption
• may encourage peer pressure and consumption by minors	• college population is old enough to make adult choices
• religious considerations	• libertarian considerations

Table 2
Descriptions of Knowledge Source Categories

Knowledge Source	Description
Don't Know How To Reach Goal	Planner state explicitly that they do not know how to accomplish the goal. *Examples* (Persuasion) "I was trying to see if that works into a lot of persuasion scenes, but I couldn't think of any."
Ensembles of Episodes	Planners simultaneously consider a number of similar experiences they have had when trying to reach the goal. *Examples* (Roomate) "I was thinking of past roommates that I've had." (Persuasion) "I was trying to remember, remember back to experiences I've had."
Experiment 1	Planners specifically reference Experiment 1 *Examples* (Roommate) "Same thing as last time, I guess." (Persuasion) "I was thinking about . . . what I said, my reasons when I was speaking to that woman the other time."
Hypothetical Episodes	Planner imagine themselves in a specific situation where they are trying to accomplish the goal, but not a situation that they have actually experienced in the past. *Examples* (Roommate) "I was trying to put myself in the actual position where maybe I was actually encountering a roommate of mine for the first time." (Persuasion) "I was probably trying to picutre who I'd be trying to convince of this."
Instruction	Planners state that they have had explicit instruction in how to achieve the goal. *Example* (Roommate) "You're taught how to be nice to people."
Lack of Same/Similar Episodes	Planners specifically state lack of same or similar episodes to draw from. *Example* (Roommate) "I've never been in the situation before."

Knowledge Source	Description
No Awareness of Source	Planners state they do not know what knowledge sources they tap.
No Desire To Reach Goal	Planners indicate that they would not want to achieve the goal. *Examples* (Persuasion) "I really don't care 'cause I don't drink, and it doesn't really make me much difference, I guess."
Previous Plan	Planners state they have developed plans to achieve goal previously. *Examples* (Roommate) "Trying to think what I did, trying to think if I'd do the same." (Persuasion) "I was thinking about a couple of people I'm friends with . . . and I ask them . . . their views on it, and they told me . . . and I just remembered that and kind of went through the same thing."
Role Models	Planners cite a person or persons who have accomplished the goal and employ their actions as a planning source. *Example* (Roommate) "Just the experience I've had through friends." (Persuasion) "I was just trying to think of specific points to convince ... "
Similar Episodes	Planners recall a specific situation in which they have attempted to achieve a similar goal. *Examples* (Roommate) "That's pretty much what I do when I just meet someone in general." (Persuasion) "In a different persuasion situation, it's kind of a give-and-take sort of thing . . . I was trying to see if that works into a lot of persuasion scenes."
Specific Episodes	Planners recall a specific situation in which they have attempted to achieve the same goal. *Examples* (Roommate) "I was thinking in my mind of a situation like that when I was a freshman." (Persuasion) "My parents especially, my parents are always like 'well, I think it's a good thing.'"

Table 3

Number of Participants Adjusting Plans as a Function of Success or Failure (Persuasion Goal)

	Plan Modification	
	Would Change Plan	Actually Changed Plan
Succeeded	5	4
Failed	4	7

Table 4

Top Three Conceptual Action Units Between Experiments 1 and 2

Goal	Conceptual Action Unit	Exp. 1	Exp. 2
Roommate	Self Disclosure	93.3%	---
	Ask about Hometown	86.6%	---
	Ask about Interests	80%	73.3%
	Seeking Similarities	---	53.3%
	Introduction	---	46.6%
Persuasion	Irrelevance Argument	60%	---
	Expertise	46.6%	---
	Safety Argument	53.3%	33.3%
	Negative Example	----	40%
	Assessing Reaction	---	40%

Table 5

Knowledge Sources for Roommate and Persuasion Goals

Goal	Top 3 Knowledge Sources	Mentioned by % of Participants
Roommate	Specific Episodes	46.6%
	Previous Plan	40%
	Hypothetical Episodes	26.6%
Persuasion	Role Model	53.3%
	Previous Plan	26.6%
	Hypothetical Episodes	26.6%*

* percentages do not add to 100% because participants used multiple knowledge sources

Bibliography

Berger, C. R. (1988). Planning, affect, and social action generation. In L. Donohew, H. E. Sypher, & E. T. Higgins (Eds.), Communication, social cognition, and affect (pp. 93-116). Hillsdale, NJ: Erlbaum.

Berger, C.R., & diBattista, P. (1992). Information seeking and plan elaboration: What do you need to know to know what to do? Communication Monographs, 59(4), 368-387.

Berger, C. R., & Jordan, J. M. (1992). Planning sources, planning difficulty, and verbal fluency. Communication Monographs, 59(3), 130-149.

Berger, C. R., & Kellermann, K. A. (1983). To ask or not to ask: Is that a question? In R. N. Bostrom (Ed.), Communication yearbook 7 (pp. 342-368). Newbury Park, CA: Sage.

Carberry, S. (1990). Plan recognition in natural language dialogue. Cambridge, MA: MIT Press.

Cody, M. J., & McLaughlin, M. C. (1990). Introduction. In M. J. Cody & M. C. McLaughlin (Eds.), The psychology of tactical communication (pp. 1-28). Clevedon, Avon, England: Multilingual Matters.

Dillard, J. P. (1990). The nature and substance of goals in tactical communication. In M. J. Cody & M. C. McLaughlin (Eds.), The psychology of tactical communication (pp. 70-90). Clevedon, Avon, England: Multilingual Matters.

Ericsson, K. A., & Simon, H.-A. (1993). Protocol analysis: Verbal reports on data (rev. ed). Cambridge, MA: MIT.

Friedman, S. L., Scholnick, E. K., & Cocking, R. R. (1987). Reflections on reflections: What planning is and how it develops. In S. L. Friedman, E. K. Scholnick, & R. R. Cocking (Eds.), Blueprints for thinking: The role of planning in cognitive development (pp. 515-534). New York: Cambridge University Press.

Greene, J. O., & Lindsey, A. E. (1989). Encoding processes in the production of multiple-goal messages. Human Communication Research, 16(1), 120-140.

Hammond, K. J. (1989). Case-based planning: Viewing planning as a memory task. San Diego, CA: Academic Press.

Schank, R. C. (1982). Dynamic memory: A theory of reminding and learning in computers and people. New York: Cambridge Press.

Schank, R. C. (1989). Preface. In K. J. Hammond, Case-based planing: Viewing planning as a memory task (pp. xii-xvi). San Diego, CA: Academic Press.

Waldron, U. R. (1990). Constrained rationality: Situational influences on information acquisition plans and tactics. Communication Monographs, 57, 184-201.

Wilson, S. R. (1990). Development and test of a cognitive rules model of interaction goals. Communication Monographs, 57, 81-103.